



EPI Update

Tim Müller (CCI Group, UvA)

t.muller@uva.nl

EPI Consortium Meeting - 8 November 2022

Introduction

- **EPI Framework**

“Programmable orchestration of applications and networking in a sensitive environment”

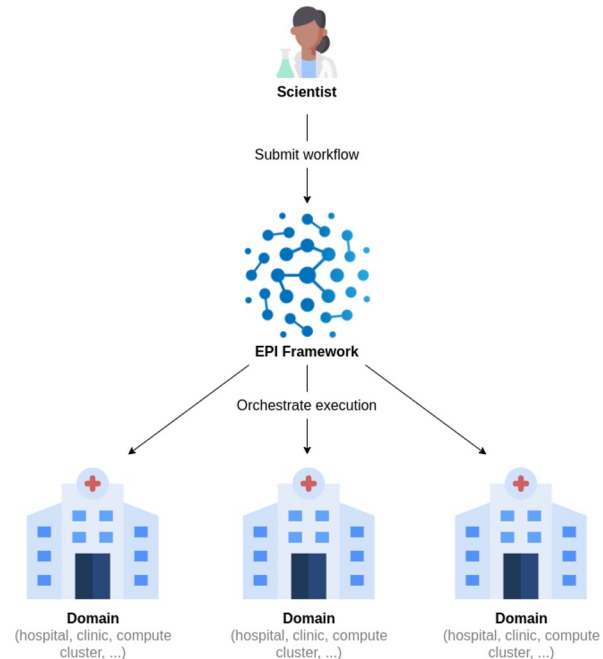
(RQ 5 & RQ 6)

- **Workflow execution system**

- **Workflows** (i.e., scientific computing)
- Packages / External **functions**
- User → Central node → Worker nodes

- **Composed of:**

- **Brane**
- The Bridging Function Chain Re-assignment & Orchestration Framework (**BRO**)
- (eFLINT) **Policy reasoners**



Previously in this theatre...

- Initializing **Proof-of-Concept (PoC)**
 - Rosanne's use-case (federated computation)
 - Three domains: **UMC Utrecht, St. Antonius & SURF**

- Initializing **policy integration in EPI Framework**
 - Introduce “**Data**” notion
 - Compile to workflows
 - Add **eFLINT policy reasoner** (checker)
 - Integrate **BRO**

Progress made

- Initializing **Proof-of-Concept (PoC)**
 - Rosanne's use-case (federated computation) ✓
 - Three domains: **UMC Utrecht**, **St. Antonius** & **SURF**
 - ✓
 - ✓*
 - ✓
- Initializing **policy integration in EPI Framework**
 - Introduce “**Data**” notion ✓
 - Compile to workflows ✓
 - Add **eFLINT*** **policy reasoner** (checker) ✓
 - Integrate **BRO** ✓

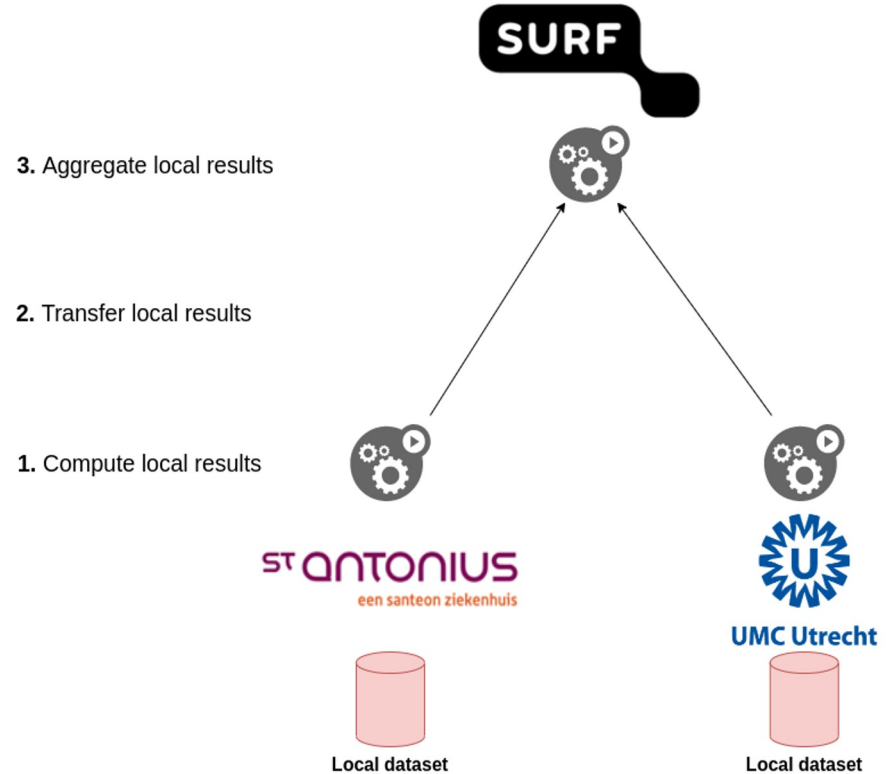
The PoC

The Goal

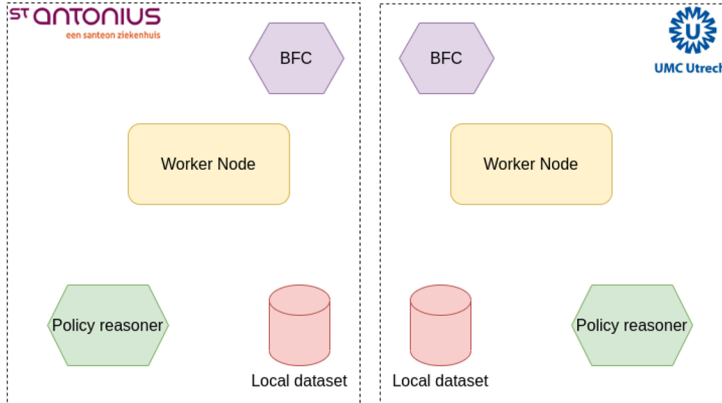
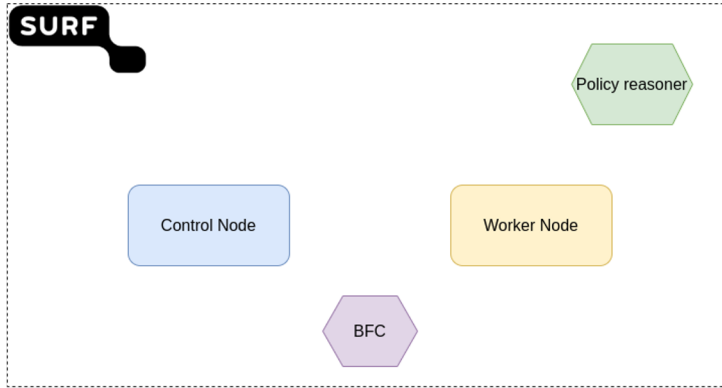
- **Preparation** for future use-cases
 - Rosanne's use-case (next slide)
 - Corinne's use-case
- **Testing** of EPI Framework
 - *"In the wild"*
 - Policy integration
 - Hospital security
- **Exploration** of policies
 - Data-level
 - Network-level

Use-case

- Rosanne's use-case
- **Stratified confidence sequence analysis** for psychiatric treatments
- Infrastructure perspective: **federated setup**
- Test data (then ECT dataset)



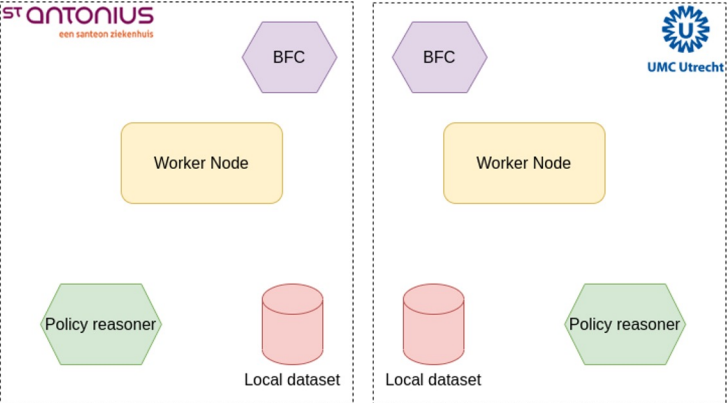
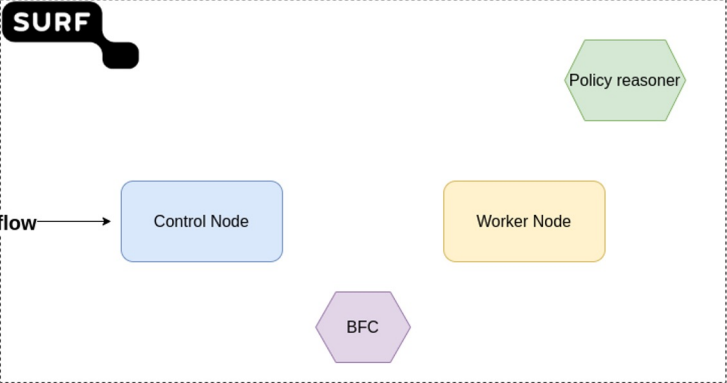
In practice



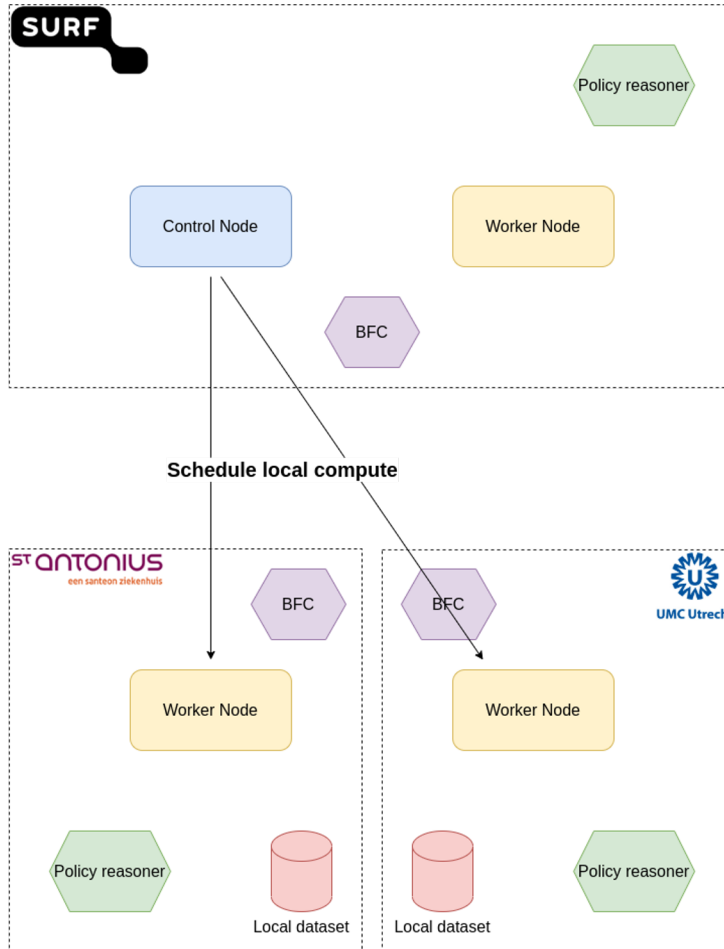
In practice



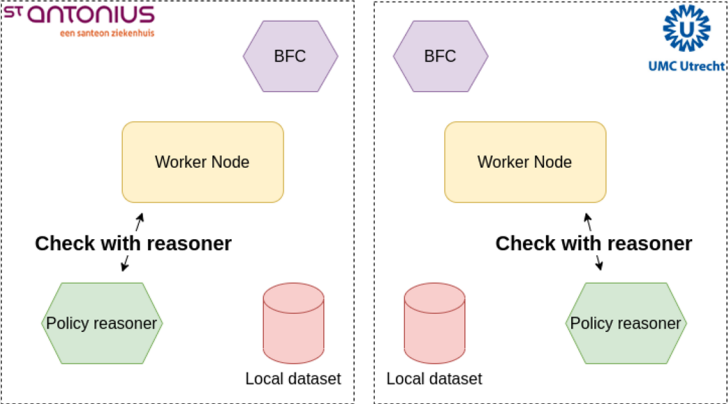
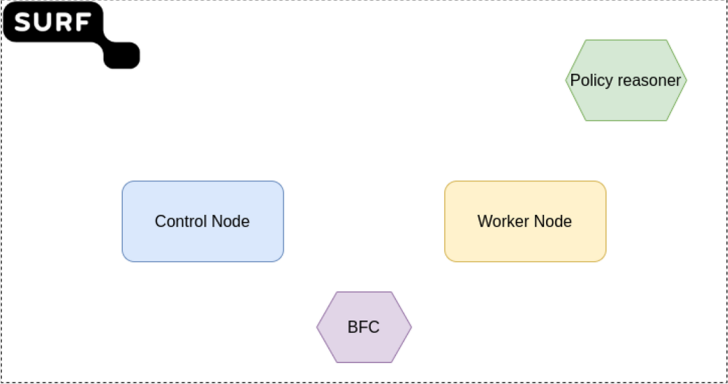
Submit workflow



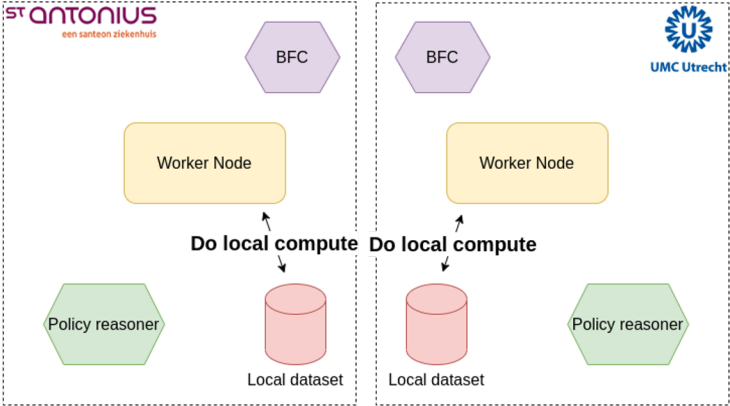
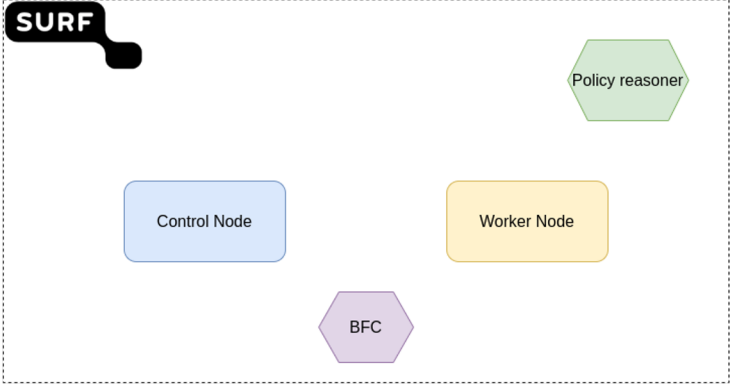
In practice



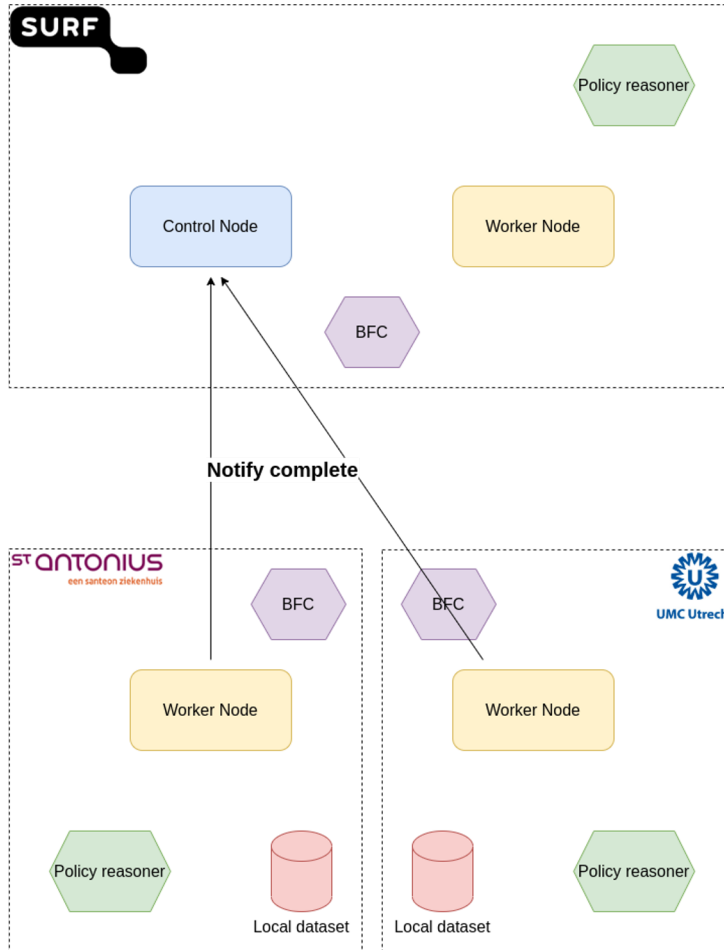
In practice



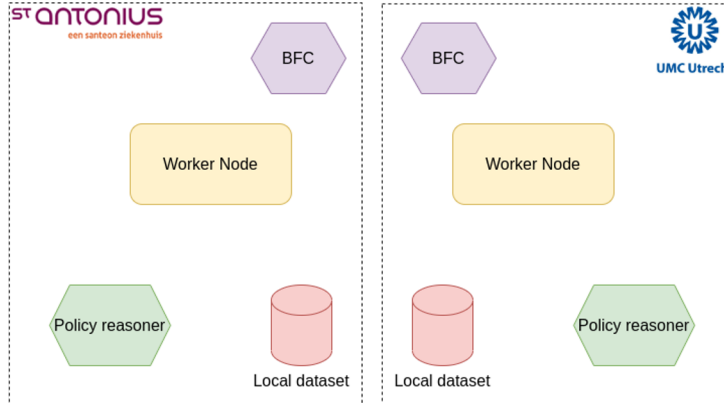
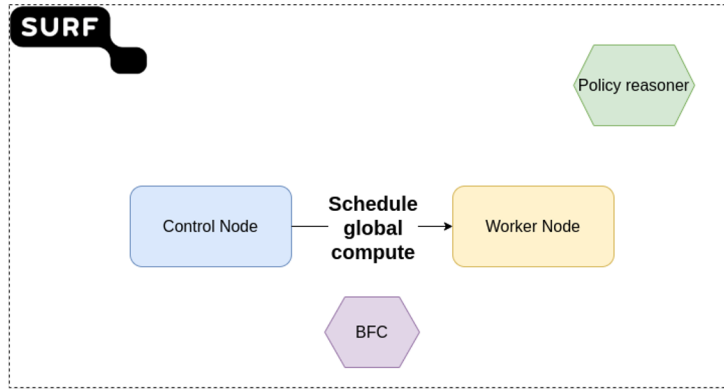
In practice



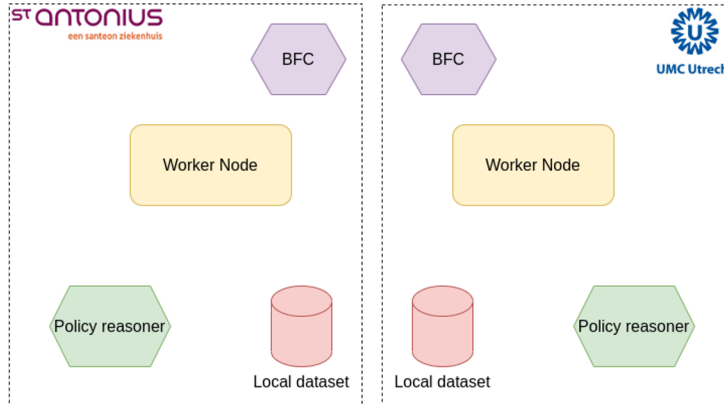
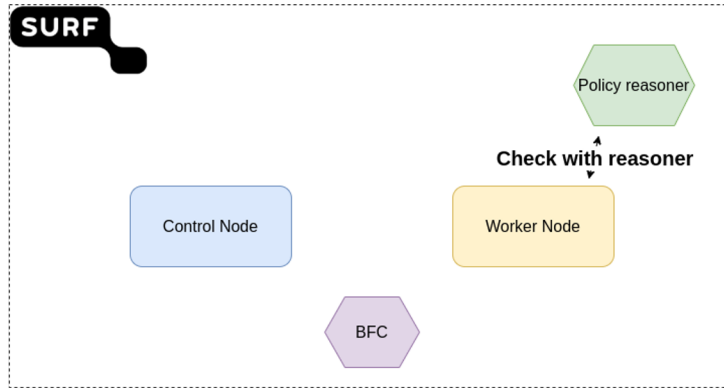
In practice



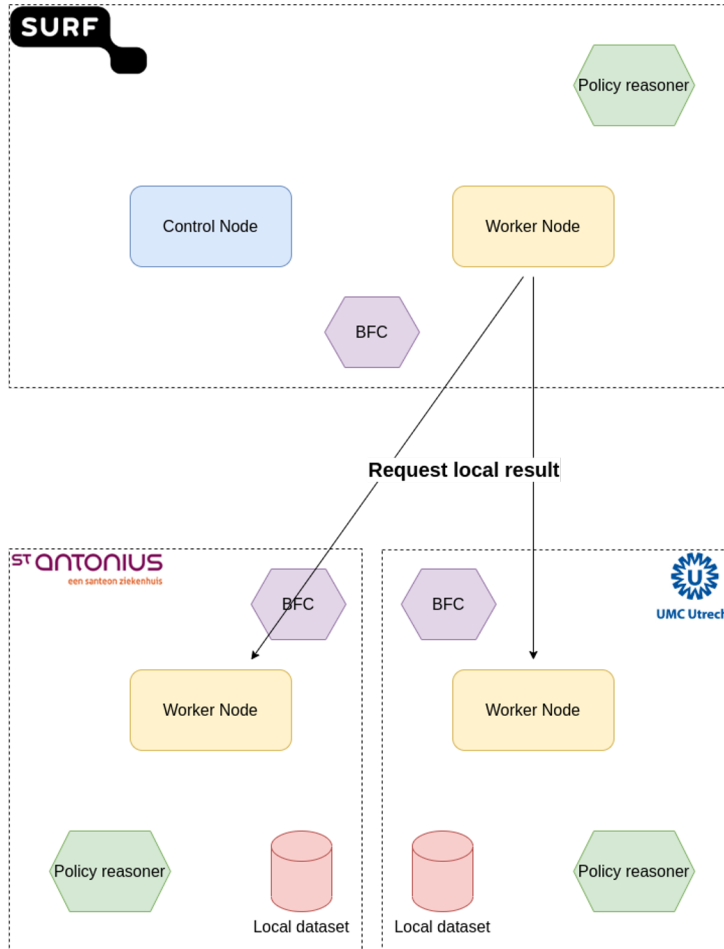
In practice



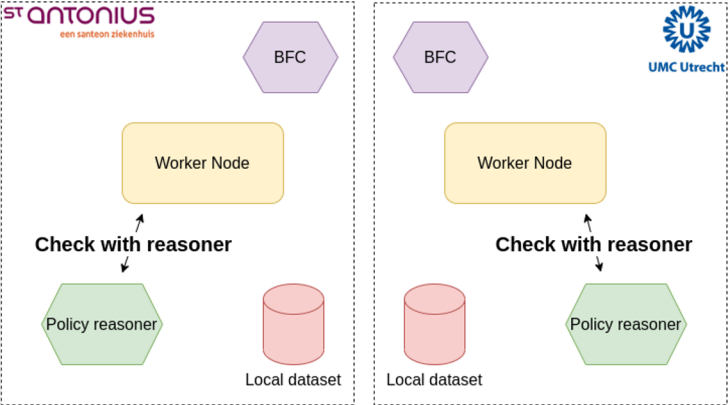
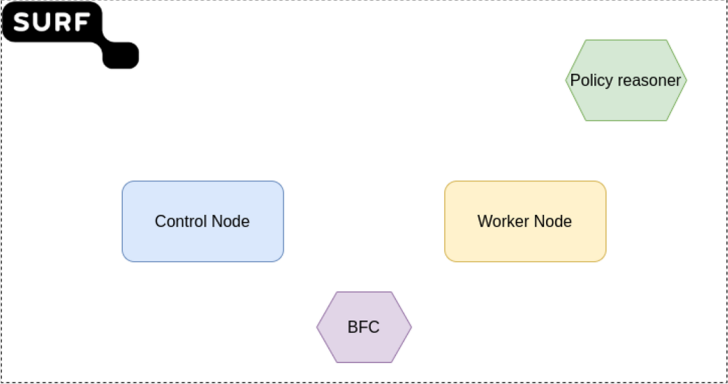
In practice



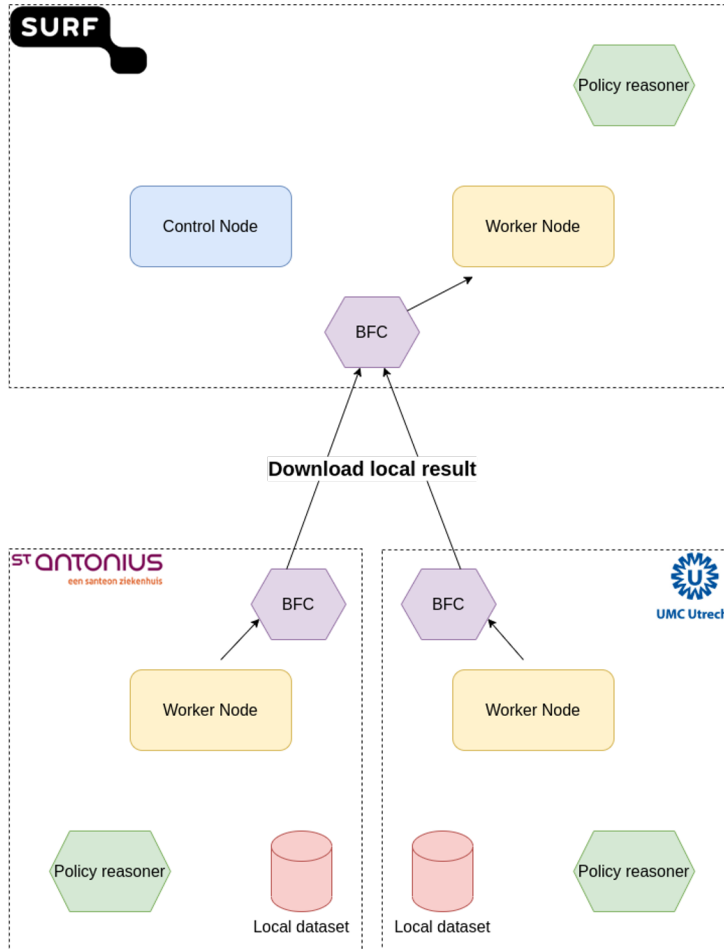
In practice



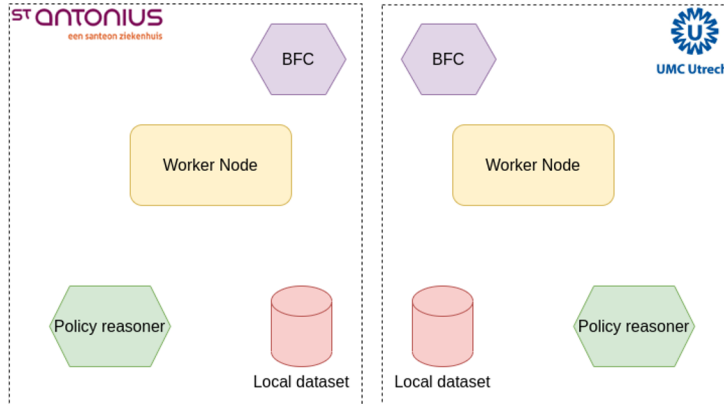
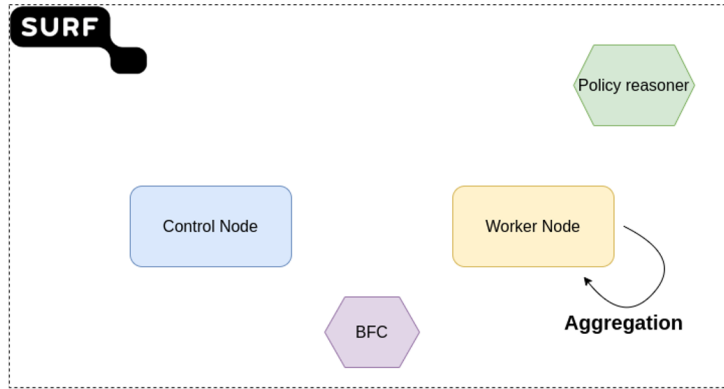
In practice



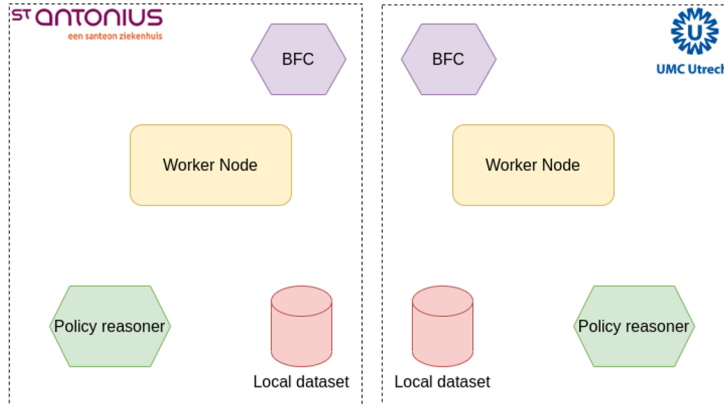
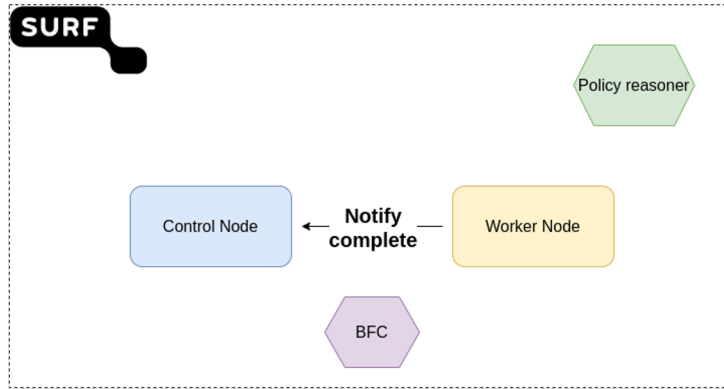
In practice



In practice



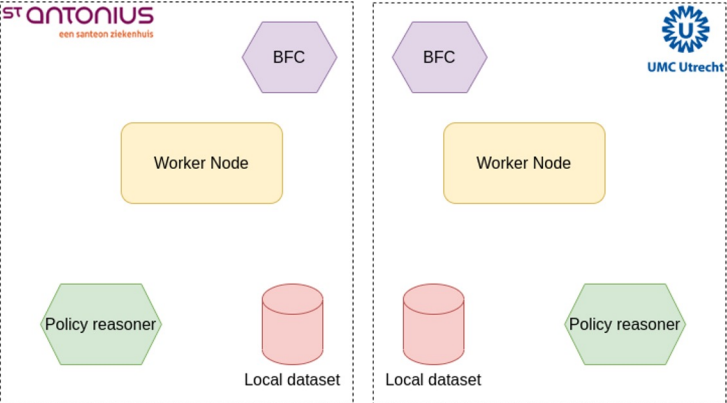
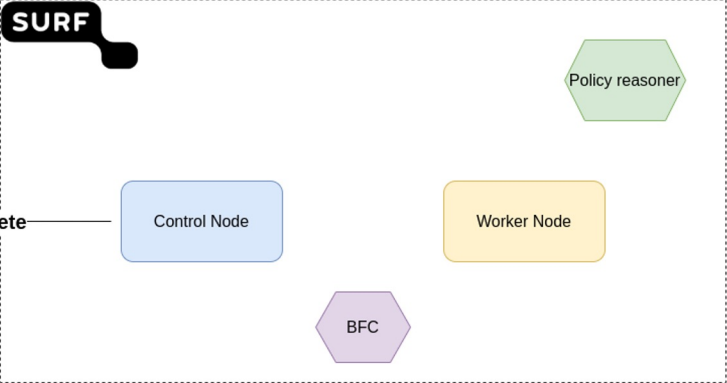
In practice



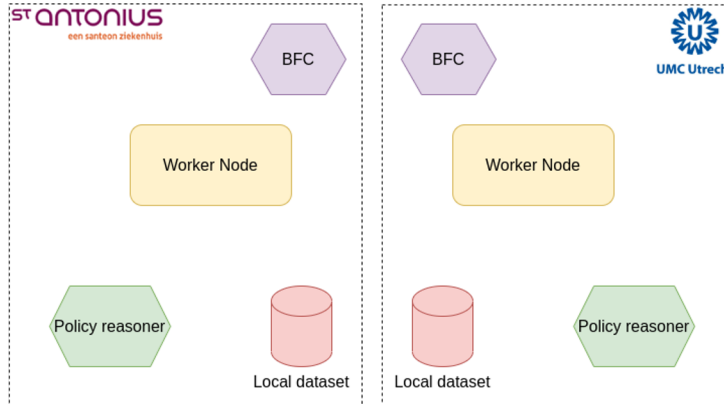
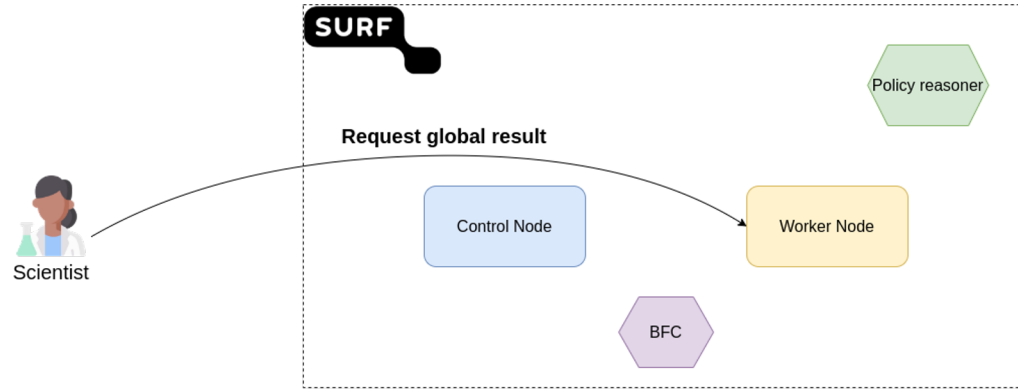
In practice



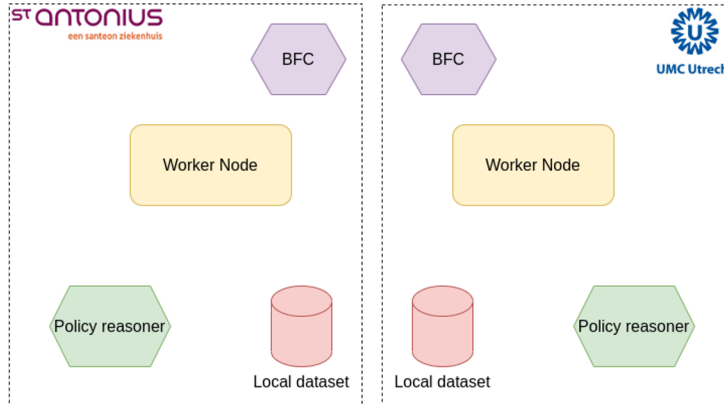
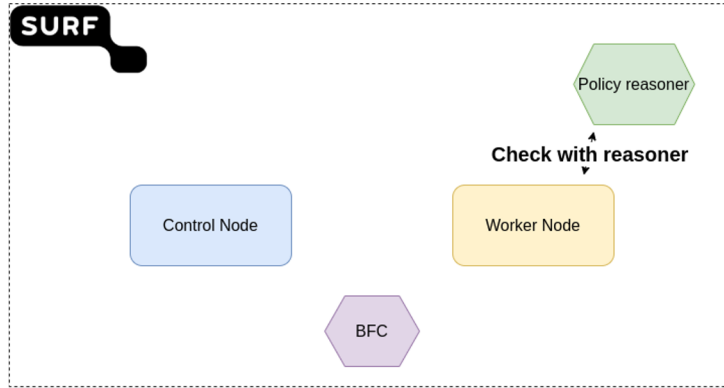
Notify complete



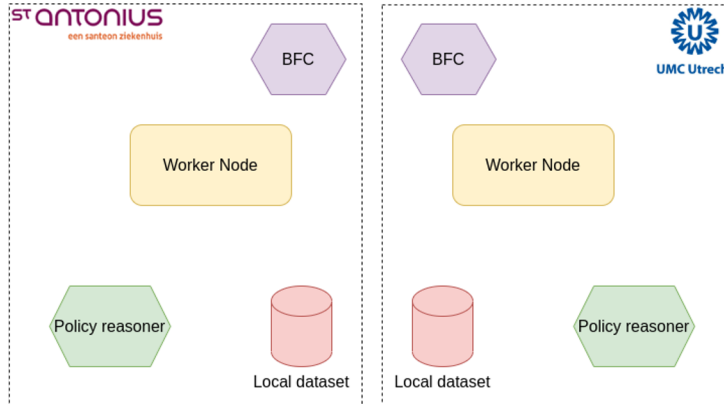
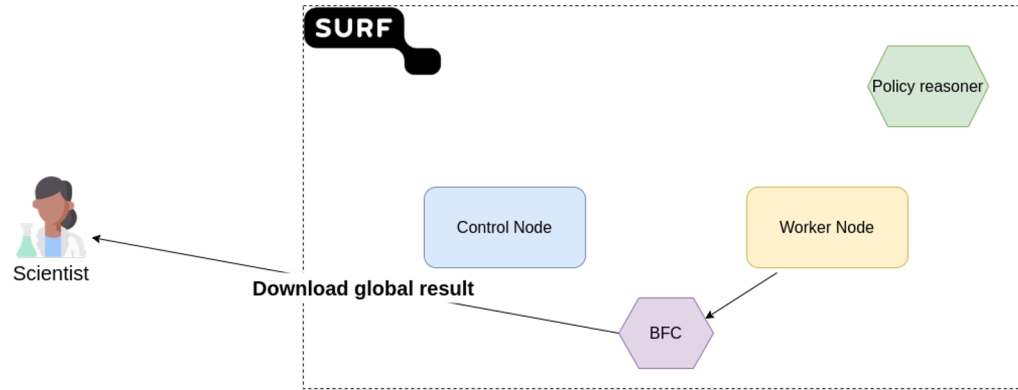
In practice



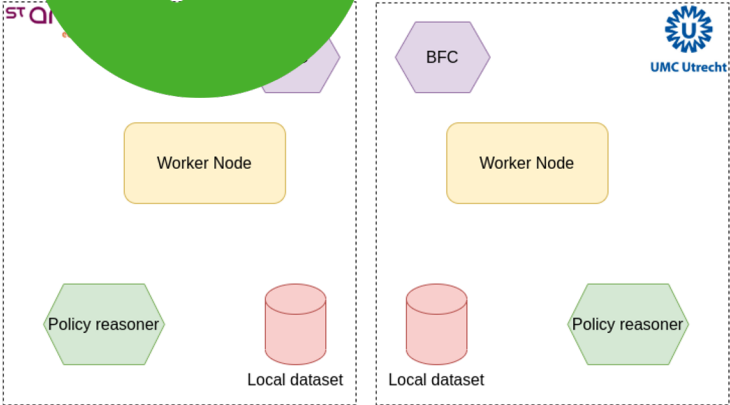
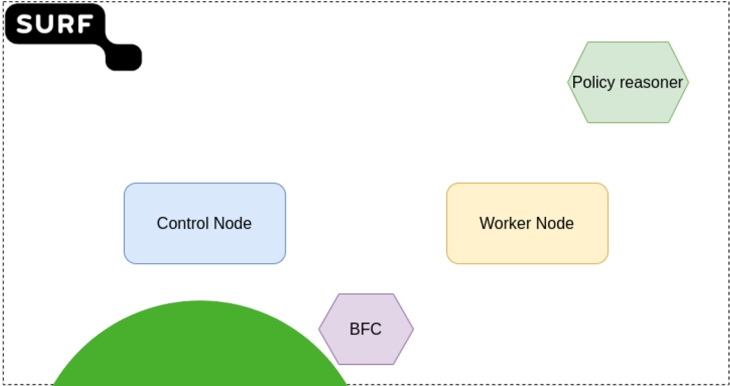
In practice



In practice



In practice



Status

- **Rosanne's code** is implemented in EPI Framework-format
- **The infrastructure** is almost there
 - St. Antonius gave access yesterday (to-be-tested)
 - UMC Utrecht had some delays, but working on it
- **The framework** is almost there

What's next

- Replace test dataset → **ECT dataset**
 - No additional agreements/risk analysis required
 - Pentesting?
- Turning the **PoC** → **Use-case**
 - Automatic execution
 - Automatic feedback of result (e.g., dashboard, e-mail, ...)
 - Tricky due to shielded setup

EPI Framework

Status

- Policy integration complete
 - ...largely
- Refactored framework for reasoner
 - Using different **workflow representation**
 - Introduced **dataset** concepts
 - Smarter **compiler**
- Some shortcuts taken
 - **No eFLINT** (hardcoded policies)
 - **Static BFC** (hardcoded chains)
 - **Not** all types of **workflows** supported yet
 - **Containers not signed** yet (any program accepted)
 - **Dumb planner** (user has to specify manually if non-trivial)

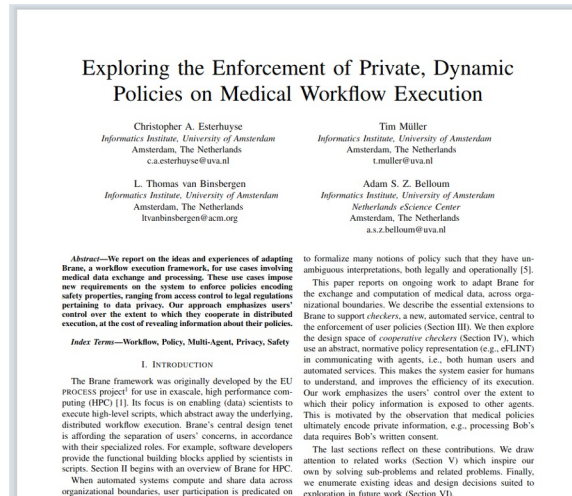
```
// Reference a dataset advertised by a domain
let data1 := new Data{ name := "some_dataset" };

// The framework will automatically place the
// function near the data
let res1 := some_computation(data1);

// If function -> data is non-trivial, then it
// will be able to automatically deduce where
// to pull it from
let data2 := new Data{
  name := "other_dataset"
};
let res2 := other_computation(data1, data2);
```

Status - eScience Conference '22

- “Exploring the Enforcement of Private, Dynamic Policies on Medical Workflow Execution”
 - ReWorDS Workshop 2nd Edition
 - Together with Christopher Esterhuysen
 - Not yet published (see <https://enablingpersonalizedinterventions.nl> when it is)



What's next

- **Fix shortcuts**
 - **Not really useable** for any other use-case right now
 - Most notably:
 - Integrate **eFLINT** reasoner
 - Integrate **BRO** more tightly (make **BFCs** non-static)
- **Create clever planner**
 - Hard problem, team effort with eFLINT people (AMdEX)
- **Expand user-friendliness**
 - Re-add **Bakery**
 - Support for **clusters backends** (Kubernetes, Slurm, ...)
 - Support for other methods of **authentication**
 - Support for other methods of **accessing data**

What's next - Tutorial

- **Tutorial on EPI Framework**
 - Mostly in current state
- Try the framework yourself!
 - Try your hand at writing packages, workflows, execution, security, ...
 - Go into the technical details

- **When?** ~ First week of December
- **Where?** At Science Park
- More information will be shared

Conclusion

Conclusion

- First **PoC** is **almost complete**
 - Framework also ready as a PoC
 - Rosanne's use-case implemented
 - Infrastructure nearly ready
- Once we have those, we can **deploy**

- What's next
 - Extend **PoC** into a "real" **Use-case**
 - Make framework more mature
 - See next agenda point :)



BRANE

Tim Müller (t.muller@uva.nl)

enablingpersonalizedinterventions.nl

github.com/epi-project/brane

wiki.enablingpersonalizedinterventions.nl (WIP)



The icons (not logos) in this presentation are from Flaticon.com